

Genius Paid **FROM FOUR CENTS TO A MILLION**

In 1884 a man arrived in New York from Europe with four cents in his pocket. Five years later he was a millionaire and assured of a steady income for the rest of his life.

The genius of Nikola Tesla had been justified.

As a boy in Austria-Hungary, Tesla was a prodigy. After his first term at the Polytechnic, the dean of the Technical Faculty wrote of Tesla to his father:

"Your son's ability to read and converse in four languages, and to read them with complete understanding

with complete understanding of even the most idiomatic phrases—his brilliance in the laboratory and his excellence in all forms of mathematics have impressed every member of the faculty. Your son is a star of the first magnitude."

At Prague University, Tesla developed his interest in electricity. After graduating, he worked in a telephone exchange, and while there invented the alternating-current motor. He migrated to Paris, where he tried to sell his invention and failed.

In desperation Tesla went to the United States.

In a few years, with unlimited financial resources (for the Americans were very interested in his inventions) he embarked on an energetic research and development programme.

The result was 212 patents, 110 of which still are in constant use in modern life.

The author has collected much interesting information, but the book is not well planned or well written.

It fails to create a genuine picture of Tesla the man and of his technical achievements.

of his technical achievements.
Too much of it is surmise
and not enough of it is fact.
—C.R.

**NICOLA TESLA: ELEC-
TRICAL GENIUS, by Ar-
thur J. Beckhard. Dobson.
12/6.**

A MACHINE TO ABOLISH WARFARE.

Nikola Tesla, the electrical genius who invented the oscillator, announces that he has devised a machine that will abolish warfare.

This machine is a boat that will go without men on board, and can be controlled for any distance, without wires. It will obey orders from the land or it will act on its own judgment, according to the necessities of the situation. It has a mind. It will carry an unlimited quantity of explosives, which can be aimed with unerring accuracy.

All the ships in the world would be powerless against a few of these boats, which he calls "telautomatons." If the United States possessed a flotilla of them they would be able to wipe out of existence the whole navy of England as soon as it appeared in sight, or perhaps before that.

Mr. Tesla's announcement of his invention is made in the course of an article in the "Century Magazine" for June on "The Problem of Increasing Human Energy." He argues that in order to promote the advancement of mankind we must not only increase the intellect of the race and add to its material resources, but we must abolish the negative forces which retard its development. Chief among these is war, which has taken the place once held by ignorance.

Now, Mr. Tesla holds that the only way to abolish war is to make it bloodless. Obviously this cannot be done by increasing the power of

GUNS AND EXPLOSIVES

to however great an extent. The only way to make it bloodless is to fight with intelligent machines--machines so powerful that it would be impossible to oppose them to human beings. Then men might realize the

human beings. Then men might realise the folly of war. At any rate, the fact that it would be bloodless would be an enormous advance.

"So long as men meet in battle there will be bloodshed," says Mr. Tesla. "Bloodshed will ever keep up barbarous passion. To break this fierce spirit a radical departure must be made, an entirely new principle must be introduced; something that never existed before in warfare—a principle which will forcibly, and unavoidably, turn the battle into a mere spectacle, a play, a contest without loss of blood. To bring on this result men must be dispensed with; machine must fight machine. But how accomplish that which seems impossible? The answer is simple enough: Produce a machine capable of acting as though it were part of a human being; no mere mechanical contrivance, comprising levers, screws, wheels, clutches, and nothing more, but a machine embodying

A HIGHER PRINCIPLE,

which will enable it to perform its duties as though it had intelligence, experience, reason, judgment, a mind!"

What first suggested to Mr. Tesla the idea of such a machine was the discovery that he himself was an automaton responding to external influences. An impression fell on his eye and that caused his brain to think automatically.

He then conceived the idea of constructing an automaton which would represent himself, and which would respond as he did to external influences. Such an automaton had to have motive power, organs for locomotion, directive organs and one or more sensitive organs, so adapted as to be excited by external influences. This machine would, he reasoned, perform its movements in the manner of a living being, for it would have all the chief mechanical characteristics of the same. He did not consider it necessary to supply the functions of growth and propagation to the machine.

In order to perform its duties intelligently it had to have a mind which would control its movements and cause it to act, in any un-

its movements and cause it to act, in any unforeseen case that might present itself, with knowledge, reason, judgment and experience. This element he could easily supply by conveying to the machine his own intelligence. On this plan his invention was evolved, and a new science came into existence, which Mr. Tesla calls "telautomatics." This word means the art of controlling the movements and operations of distant automatons.

The principle is applicable to any kind of machine that moves on land, or in the water or in the air. An electric circuit adjusted to distant vibrations furnishes the directing power. A storage battery within it furnishes the motive power. A propeller moves the boat. The rudder is controlled by another motor driven by the battery.

At first Mr. Tesla planned to furnish the boat with a

SENSITIVE ORGAN

corresponding to the human eye, in other words, a selenium cell responsive to rays of light. But upon examination he found that no satisfactory control of the automaton could be obtained by rays of light. The principal reason was that any obstacle coming between the operator and the boat might place it beyond his control. Another reason was that the use of rays would make it difficult to give the automaton characteristics distinguishing it from other machines of the same kind. It was necessary that it should respond only to an individual call as a person does to a name.

These considerations led him to select a sensitive organ for the machine corresponding to the human ear, rather than the eye. This ear can be controlled regardless of intervening obstacles and of the position of the controlling apparatus, and would be unresponsive to any one but the master who possessed the secret of commanding it. Waves of sound spread in all directions and follow the path of least resistance, however crooked, while rays of light proceed only in straight lines.

The sensitive organ with which the telautomaton is now fitted corresponds, then, to the human ear. It consists of an electric circuit placed within the boat and adjusted, or "tuned," exactly to electrical

placed within the boat and adjusted, or "tuned," exactly to electrical vibrations of the proper kind transmitted to it from a distant electrical oscillator. This circuit, responding to the transmitted vibrations, affects magnets and other contrivances in the boat through the medium of which are controlled the movements of the propeller and rudder and all other parts.

Thus it can be directed to proceed to a port, however distant, or to stop at any desired spot in the ocean. Its guns and other weapons of offence, if it were furnished with them, would be directed by the same mechanism, or it can be propelled

LIKE A VAST TORPEDO

against an enemy's ship. No men being on board of it, all considerations arising from human weakness which play so great a part in warfare are eliminated.

But Mr. Tesla is not satisfied with the telautomation in this condition, and has made his plans for constructing one which will have its own mind. By this he means that it will be able, independently of any operator, and left entirely to itself, "to perform in response to external influences affecting its sensitive organs a great variety of acts and operations as it had intelligence." It will be able to follow a course laid out for

it or to obey orders given far in advance. It will be capable of distinguishing between what it ought and what it ought not to do, and of making experiences which will definitely affect its subsequent action.

The inventor declares that he evolved this plan many years ago. It was not until after he had perfected and explained it to many friends in his laboratory that it became known at all. It was then generally misunderstood. Those who admitted its practicability saw in it merely an automobile torpedo which was to be used for the purpose of blowing up battleships. The general impression was that he contemplated the steering of such a vessel by means of light rays.

There are already, as Mr. Tesla says, torpedoes steered electrically by wires and

torpedoes steered electrically by wires and others steered electrically without wires. Had he done nothing more than make a small advance on these devices he should not regard it as a matter of great importance.

But his invention does not merely control the direction of a moving vessel. It affords a means of absolutely controlling in every respect all the movements of the vessel and all the operations of its internal organs, no matter how many. This includes, of course, the operation of all guns, torpedoes, and other weapons with which it is furnished.

Mr. Tesla declares that criticisms to the effect that the control of this automation could be interfered with were made by people who do not even dream of

THE WONDERFUL RESULTS

than can be obtained by the use of electrical vibration.

The principle of this invention is declared by Mr. Tesla to be equally applicable to submarine and aerial vessels. This adds enormously to its possibilities of destructiveness. The idea of these engines of devastation swarming not only over the surface of the sea but under and up in the sky, is enough to appal the stoutest mind.

"There is," says the inventor, "virtually no restriction as to the amount of explosives it can carry, or as to the distance it can strike, and failure is almost impossible."

The force of the principle does not reside wholly in its destructiveness. It introduces into warfare an element which never existed before, a fighting machine without men, as a means of attack and defence. The continuous development in this direction must ultimately make war a mere contest of machines without men and without loss of life—a condition which would have been impossible without this new departure, and which, in his opinion, much be reached as preliminary to permanent peace.

Mr. Tesla regards the production of a successful airship within a few years as a certainty. His invention will then be applied to aerial navigation. The fact that no men will have to ride in the airship when thus equipped contributes enormously to its chances of success.

TESLA; THE MAGICIAN.

Nikola Tesla, the famous Austrian American, bears an honoured name in electrical science, and has done memorable work in oscillatory currents and in connection with Hertzian waves. A few years ago, says the "Technical World Magazine," it may be remembered, he stood in the theatre of the Royal Institution with oscillatory currents of unheard of voltage playing about his unharmed head, and this taste for the sensational appears to grow with increasing years, so that now Tesla's projects nearly always have a ring of the glaringly impossible, and are seldom anything more than plausible. His latest idea is that of creating an enormous tidal wave for purposes of coast defence in order to annihilate a hostile fleet. It may be assumed, remarks Mr. Tesla that thirty tons of nitroglycerine compound be employed to create the tidal disturbance. This material, weighing about twice as much as water can be stored in a cubical tank 8ft. each way, or in a spherical vessel of 10ft. diameter. At the propitious moment, the signal is given, the charge sunk to the proper depth and ignited. The water is incompressible. The explosion propagates through the compound at a speed of three miles a second, so that the whole mass will be converted into gas before the water can give way appreciably, and a spherical bubble 10ft. in diameter will form. The gaseous pressure against the surrounding water will be 20,000 atmospheres, or 140 tons to the square inch. At this point, Mr. Tesla relapses into a maze of calculations of calories and power units where it is difficult and unnecessary to follow him. He emerges presently with the resultant statement that 25,000,000 tons of water would be raised one foot, or a smaller

be raised one foot, or a smaller quantity to a correspondingly greater elevation. The height and length of the wave will be determined by the depth at which the disturbance originated. Opening in the centre like a volcano, the great hollows will belch forth a shower of ice. Some sixteen seconds later a volley of 600ft. depth, counted from normal ocean-level, will form, surrounded by a perfectly circular swell, approximately of equal height, which will enlarge in diameter at the rate of about 220ft. per second. It is futile, concludes Mr. Tesla pleasantly, to consider the effect on a neighbouring vessel however large. Even a navy would be destroyed.

LOST CIVILISATIONS

OF A BYGONE AGE

(Concluded.)

It is interesting to note with regard to the inscriptions found on the Indus, that Professor Guillaume de Harvesy has informed the French Academy of Science that more than 130 signs and symbols in the Indian hieroglyphics are identical with characters in script on tablets, weapons, etc., found on Easter Island. He contends that Easter Island and Indian scripts originated from the same source. It seems certain that navigation was sufficiently well developed 5000 to 6000 years ago to enable men to travel safely across the vast waste of the Pacific.

Professor Macmillan Brown, of Christchurch, New Zealand, perhaps the foremost authority on the subject of the Pacific, says, in dealing with the ruins of great temples on Maldon Is-

ruins of great temples on Maldon Island, that the people who built the temples could not have lived on the island as it is to-day, for it is quite incapable of supporting human life. The work could not have been accomplished without such surplus wealth and such armies of labour as could not be procured in the present state of the Pacific from all the archipelagoes within a radius of several thousands of miles. Professor Brown says "There is evidence of organised communities, if not empires, having vanished in the bosom of the Pacific."

"The great ruins on the reefs of Ponape (in the Carolines) cannot be explained without assuming a submerged empire with millions of inhabitants," he says. "And away to the north-west of it, the advanced script of about five dozen characters that I discovered on the little island of Uleai, with its 600 inhabitants, argues a highly organised empire in the past that needed it as essential to its organisation." Another lost civilisation of which we have no record.

And what of the lost Atlantis?

And what of the lost Atlantis? Plato referred to it as a vast island in the Atlantic of which an Egyptian priest had told Solon, and which had been engulfed by an earthquake 900 years before Plato's time. I have seen some ancient charts with an island in the Atlantic marked "Atlantis or Plato's Island" that is certainly not there to-day; and I have seen with my own eyes thousands of migrating birds hovering over and wheeling around the spot where it is marked on the old charts. There is a hypothesis of land bridges across the Atlantic, and this is supported by the fact that up to the present day the lemmings (a small rodent of northern Europe) migrate in millions at certain periods, and swim out in the sea towards the spot where Atlantis is supposed to have been. According to Plato, Atlantis was inhabited by a race of giants. Whether this mystery will ever be solved time alone will tell. As I write, an expedition is working to try and find the lost continent of Lemuria, believed by many to be the cradle of the human race. It is quite possible that the results of the

is quite possible that the results of the expedition will have a vital bearing upon some of the elusive problems of prehistoric civilisation. The lost continent, Lemuria, is supposed to be in the Indian Ocean. The expedition set out in August last in the "Mahahiss," 105 tons, under Captain J. M. MacKenzie, Captain of the "Discovery" on Sir Douglas Mawson's last voyage to the Antarctic, Colonel Seymour Sewell D.Sc., director of the Zoological Society of India, is scientific leader of the party of British scientists. The expedition is fitted out with the latest devices for exploration to a depth of over four miles beneath the ocean. It is proposed to spend nine months upon the search for the lost continent, and the scientific world awaits the result with deep interest.

One would be foolish to deny that we of this civilisation are progressing, but, even in the most enlightened nations, civilisation has frozen in its methods. There are many grades of people, but all to-day is chaos, due largely to hidebound systems of appli-

cation and exploration. Man is getting no chance to work out his destiny in any rational way. On the one hand we have those who demand too much, on the other hand those who command too much. We have to-day in the world patents that can drive the machinery of the world without petrol or fuel. "Big Business" will not let these patents be used. I doubt if the discovery of Nikola Tesla—power from cosmic energy—will be allowed to operate. Would that the intelligences, and the brain power that can create vast commercial combines, could get a vision of a happy contented world and use their gifts to that end. At present it would seem that this civilisation is likely to, as Bernard Shaw puts it, "collapse to the grass."

There are no written records of the lost civilisations of South America, but there is a beautiful legend which has been handed down with respect to the social life of the people under Incan rule. It tells that in those far away

days the common people went to their daily work with joyous song; that the main roads of the country were planted with avenues of fruit trees for free use of the travellers. Contrast that with the social conditions of to-day, with thousands of unemployed in Australia, and cart loads of fruit and vegetables going to the tip daily. Have we reached, or progressed, to their plane?

The late Dr. Nansen, who was both a seer and a scientist, made a remarkable prediction not long before his death. He said that, in his opinion, not only would the East in the near future make a great material contribution to the world's knowledge, but that "the sorely needed spiritual message would come from that quarter also." A very similar economic and sociological message did come from the East nearly two thousand years ago. What have we done about the "glad tidings of great joy" once propounded in Gallilee?

Since writing about "Lemuria" news has come from Calcutta that the

news has come from Calcutta that the expenditure has completed the first three months' survey. Traces of Lemuria have been discovered running across the Gulf of Aden, and between India and Arabia. The Madagascar end of the oceanographic expedition has still to be surveyed.

To sum up—I am convinced that there is a period in the history of the world, of which we have no record; and that we, with all our knowledge, have not reached the plane of some lost civilisations.

“Whatnot,” said a friend of mine, “What record can past civilisations show in the realm of music, wireless, and aviation?”

I countered by asking, “What record will this civilisation leave of the things you have mentioned—in fact, of anything that must perish in time?”

Is the civilisation of to-day to go, or is there a way out? In the words of Prof. J. A. Gunn, of Melbourne University, “Civilisation to-day is threatened by the sinister forces of passion, greed, and hate. We need more and more of intellectual integrity, especially in our

intellectual integrity, especially in our public life, if democracy is to find what it needs—leadership.”

Listen to Marcus Aurelius—“Nature, which governs the whole, will soon change all things which thou seest, and out of their substance will make other things from the substance of them, in order that the world may be ever new.”

THE TESLA TORPEDO BOAT.

The following additional details have been published (says the Washington correspondent of the "Daily Chronicle") of the new submarine torpedo boat which is to "make war impossible." M. Nikola Tesla announces that he has secured American patents on the invention. The boat is simply an enlarged torpedo equipped with six 14ft. Whitehead torpedoes discharged through a single tube at the bow. The complete boat costs £10,000. It carries no crew, and is full of delicate electrical and compressed air machinery entirely under the control of a single operator on shore or ship. No wires are necessary to connect the boat with the operator. M. Tesla uses earth and atmosphere as his double wire, and thus secures a complete electrical circuit. All that is necessary, he says, is to attach to the steering gear the firing mechanism, and see that the instruments are each attuned to a certain electro-magnetic synchronism. A similar set of synchronistic instruments are all connected to one small switchboard in the hands of the operator. By simply turning a lever on the switchboard the boat is steered, submerged, raised, and the torpedoes fired. The boat, M. Tesla claims, can be operated at any distance, the operator directing the course through a telescope. He says he will run the machinery at the Paris Exposition by electricity sent across the ocean without wire, Niagara being used to generate the power. His specifications filed in the Patent Office describing the invention cover 8000 words.

AN HUNGARIAN WIZARD.

MR. TESLA'S MACHINE.

Lord Lytton in "The Coming Race," and Mr. H. G. Wells in "The War of the Worlds" and "When the Sleeper Wakes," have both drawn pictures of what the world will be like when the scientific inventor really lets himself go. An article that Mr. Nikola Tesla has contributed to the "Century" shows that these forecasts—of which Lord Lytton's at least must have been a pure child of the imagination—were singularly accurate, and are now very likely to be realised. If Mr. Tesla succeeds in making half his discoveries available for daily use, we shall have everything at our command that the Vrilys had, and shall have gone a long way towards acquiring the amazing forces of the Martians.

Some 10 years ago, in a lecture to the Royal Institution, Mr. Tesla showed that if an electric current be reversed a great number of times a minute, it will develop powers immensely in advance of anything we can produce by other means. Acting on this principle, he has succeeded in producing what is really an induction coil with 150,000 alternations of current per second. With this huge "oscillator," as he calls it, the ordinary spark of a few inches becomes a roaring blaze 70 feet across, while it produces such a disturbance of the electrical equilibrium in surrounding objects that, when at work, sparks an inch long can be drawn from a water main at a distance of 300 feet from the laboratory. Moreover, he has discovered a way of so "tuning" it that another coil similarly tuned will respond to its vibrations at a distance which he believes may be infinite, but which in practice does not seem to have been tested beyond 600 miles. He thus has at his disposal a means of conveying electric energy of millions of volts (N.B.—Two thousand volts will kill a man) to a great distance in any direction he pleases, and, of course, without any connecting wires. No known substance or power can stop or insulate this current, which can travel indifferently through

... can stop or insulate this current, which can travel indifferently through the earth or the air, nor can anyone tap or avail himself of it unless he possesses a coil exactly tuned to the vibrations of the oscillator.

ITS MARVELLOUS POWERS.

What this extraordinary machine can do outstrips all the stories of mediæval magic. By its use, Mr. Tesla claims that he can double the food supply of the world. For it offers the best and most economical means of fixing the nitrogen which, as Sir William Crooks has told us, is the life of plants, and he can therefore make two ears of corn grow where one grew before. It can produce iron in vast quantities by a cheaper process than any hitherto attempted. It can also control at enormous distances an automatic machine, as, for instance, a crewless boat, which shall carry its own propelling and steering power, and yet be as entirely under the control of the operator seated in his study hundreds of miles off as an organ is under the control of the player at the keyboard. Finally, though Mr. Tesla does not tell us so in this article, the battery can so "electrify"—to use the word in its popular sense—a room that an exhausted glass tube will glow with radiant light whenever it is brought within a certain distance of the floor or ceiling. If it does what its inventor expects of it, light and power should at no very distant date be within the reach of all, while the problem of feeding our increasing millions should be greatly simplified.

MORE MIRACLES PROMISED.

The facts so far have been proved by actual experiment, and may therefore be taken, to use the French phrase, as definitely acquired by science. But when Mr. Tesla goes on to tell us what he thinks the result of his discoveries will be, one does not wonder that an American biographer depicts him as much elated at his successes. He says that it will soon be possible to draw our supplies of electric force, not, as now, from magnets rotated by steam engines, or, still more expensively, by the decomposition of chemicals, but from the upper strata of the atmosphere. By these means we shall command a practically unlimited supply of power, and we can set about transforming the face of Nature in real earnest. War will, of course, be done away with, or rather it will be reduced

away with, or rather it will be reduced to a contest of machines, at which the nations will be "simply interested, ambitious spectators." Then machines which are now made of iron or copper will be made of aluminium—a theory, by the way, anticipated in "The War of the Worlds"—with the result that flying machines will be of daily use. These are, in fact, according to him, already on the way, and he prophesies that "the next year will see the establishment of an 'air power,' and its centre may not be far from New York." At a later date will arrive "a self-acting machine, deriving energy from the ambient medium," which will really, but for the wear and tear of its parts, come as near perpetual motion as can be. Then will come a time when earth will be too small to hold us, and we shall get more anxious than most of us are at present to establish communications with the other planets. When this happens, we shall find Mr. Tesla ready and able to oblige us. "My measurements and calculations have shown that it is perfectly practicable to produce on our globe, by the use of these principles, an electrical movement of such magnitude that, without the slightest doubt, its effect will be perceptible on some of our nearest planets, such as Venus and Mars." What will happen if the Venusites and the Martians should turn out, when we do make their acquaintance, to be armed with powers as formidable as even Mr. Tesla's oscillator he does not stop to inquire. But it is to be hoped that all this will be carefully gone into before he is allowed to make his signal.

THE PROBABLE TRUTH OF THE STORY.

How much of all this will stand further investigation remains to be seen. Although born in Hungary, Mr. Tesla has been domiciled for some time in America, where the desire for "the greatest thing on airt" shows no signs of abatement. Hence we may consider that between some of Mr. Tesla's calculations and their fruition there is yet a step or two, and that these last may present difficulties as yet unthought of. Is it certain, for instance, that because the atmosphere of our globe offers no bar to the progress of Mr. Tesla's alternating current the medium—if there is any—that occupies the inter-planetary space will be equally obliging? Or can he really prove that the sun, as he seems to assume, is the source of all the electrical energy of the earth? Some

all the electrical energy of the earth? Some have thought that the electro-motive force of lightning, to take only one example, is developed by the friction of one cloud upon another when driven by strong winds; and the theory has much to recommend it. But when all this and some other rather wild theorising is disposed of, there seems little doubt that Mr. Tesla has discovered a means of transmitting energy to a distance, and also a new method of illumination, which probably surpasses anything we have yet dreamed of. If this be so, and if—which is a large supposition—his invention can be made commercially valuable, his oscillator may really work as great a change in the conditions of civilised life as did the steam engine.

RISK OF MR. TESLA'S EXPERIMENTS.

One word may be said as to the risk of handling the enormous forces now revealed to us. One of the very oddest things about the whole matter is that these alternating currents seem to be absolutely harmless to the living human organism. Those of us who remember Mr. Tesla's visit to this country early in his career may remember how he then horrified an assemblage of savants by transmitting through his own body a current a hundred times that which in other circumstances would have caused instant death. He assures us that the same immunity has attended his experiments throughout, and that neither he nor any of his assistants has ever suffered inconvenience so long as the vibrations were sufficiently rapid and the potential sufficiently high. He now offers to transmit through his own body the entire energy of the 40,000 horse-power dynamos now worked by Niagara, and the offer is, if rather foolhardy, an undeniable guarantee of good faith. He also tells us that he has transmitted through his own hands discharges which have caused thick metal wires to melt and drop like wax, without feeling any particular sensation. As to the risk of fire, perhaps the less said about it the better. The fire insurance companies will certainly raise their rates of premium if there is any chance of one of Mr. Tesla's currents fetching loose.—"Pall Mall Gazette."

MESSAGES TO MARS.

POSSIBLE BY ELECTRICAL OSCILLATORS.

NIKOLA TESLA'S VIEWS.

In that notable article appearing in the current "Century," by Nikola Tesla, from which some extracts were quoted in last Saturday's literary supplement, the famous investigator in electricity discusses the possibilities of communicating with other planets, the time for which, he thinks, will soon come. In the description of some experiments, he states that he recognised that an efficient apparatus for the production of powerful electrical oscillations was the key to the solution of other most important electrical and, in fact, human problems. Not only was communication, to any distance, without wires possible by its means, but, likewise, the transmission of energy in great amounts, the burning of the atmospheric nitrogen, the production of an efficient illuminant, and many other results of inestimable scientific and industrial value.

MARVELLOUS PROPERTIES.

Finally, however, I had the satisfaction of accomplishing the task undertaken by the use of a new principle, the virtue of which is based on the marvellous properties of the electrical condenser. One of these is that it can discharge or explode its stored energy in an inconceivably short time. Owing to this it is unequalled in explosive violence. The explosion of dynamite is only the breath of a consumptive compared with its discharge. It is the means of producing the strongest current, the highest electrical pressure, the greatest commotion in the medium. Another of its properties, equally valuable, is that its discharge may vibrate at any rate desired up to many millions per second.

I had arrived at the limit of rates obtainable in other ways when the happy idea

able in other ways when the happy idea presented itself to me to resort to the condenser. I arranged such an instrument so as to be charged and discharged alternately in rapid succession through a coil with a few turns of stout wire, forming the primary of a transformer or induction-coil. Each time the condenser was discharged, the current would quiver in the primary wire and induce corresponding oscillations in the secondary. Thus, a transformer or induction-coil on new principles was evolved, which I have called "the electrical oscillator," partaking of those unique qualities which characterise the condenser, and enabling results to be attained impossible by other means. Electrical effects of any desired character and of intensities undreamed of before are now easily producible by perfected apparatus of this kind. For certain purposes a strong inductive effect is required; for others the greatest possible suddenness; for others again an exceptionally high rate of vibration or extreme pressure; while for certain other objects immense electrical movements are necessary.

TEN MILLION HORSE-POWER.

I have produced electrical discharges the actual path of which, from end to end, was probably more than 100ft. long; but it would not be difficult to reach lengths one hundred times as great. I have produced electrical movements occurring at the rate of approximately 100,000 horse-power; but rates of one, five, or ten million horse-power are easily practicable. In these experiments effects were developed incomparably greater than any ever produced by human agencies, and yet these results are but an embryo of what is to be.

That communication without wires to any point of the globe is practicable with such apparatus would need no demonstration, but through a discovery which I made I obtained certitude. Popularly explained, it is exactly this: When we raise the voice and hear an echo in reply, we know that the sound of the voice must have reached a distant wall or boundary, and must have been reflected from the same. Exactly

been reflected from the same. Exactly as the sound, so an electrical wave is reflected, and the same evidence which is afforded by an echo is offered by an electrical phenomenon known as a "stationary" wave—that is, a wave with fixed nodal and ventral regions. Instead of sending sound vibrations towards a distant wall, I have sent electrical vibrations towards the remote boundaries of the earth, and instead of the wall the earth has replied. In place of an echo I have obtained a stationary electrical wave, a wave reflected from afar.

MORE THAN WIRELESS TELEGRAPHY.

Stationary waves in the earth mean something more than mere telegraphy without wires to any distance. They will enable us to attain many important specific results impossible otherwise. For instance, by their use we may produce at will, from a sending station, an electrical effect in any particular region of the globe; we may determine the relative position or course of a moving object, such as a vessel at sea, the distance traversed by the same, or its speed; or we may send over the earth a wave of electricity travelling at any rate we desire, from the pace of a turtle up to lightning speed.

With these developments we have every reason to anticipate that in a time not very distant most telegraphic messages across the oceans will be transmitted without cables. For short distances we need a "wireless" telephone, which requires no expert operations. The greater the spaces to be bridged the more rational becomes communication without wires. The cable is not only an easily damaged and costly instrument, but it limits us in the speed of transmission by reason of a certain electrical property inseparable from its construction. A properly designed plant for effecting communication without wires ought to have many times the working capacity of a cable, while it will involve incomparably less expense. Not a long time will pass, I believe, before communication by cable will become obsolete, for not only will signalling by this new

for not only will signalling by this new method be quicker and cheaper, but also much safer. By using some new means for isolating the messages which I have contrived, an almost perfect privacy can be secured.

A TELEGRAM TO MARS.

I have observed the above effects so far only up to a limited distance of about 600 miles, but inasmuch as there is virtually no limit to the power of the vibrations producible with such an oscillator I feel quite confident of the success of such a plant for effecting transoceanic communication. Nor is this all. My measurements and calculations have shown that it is perfectly practicable to produce on our globe, by use of these principles, an electric movement of such magnitude that, without the slightest doubt, its effect will be perceptible on some of our nearer planets, as Venus and Mars. Thus, from mere possibility, interplanetary communication has entered the stage of probability. In fact, that we can produce a distinct effect on one of these planets in this novel manner—namely, by disturbing the electrical condition of the earth—is beyond any doubt. This way of effecting such communication is, however, essentially different from all others which have so far been proposed by scientific men. In all the previous instances only a minute fraction of the total energy reaching the planet—as much as it would be possible to concentrate in a reflector—could be utilised by the supposed observer in his instrument. By the means I have developed he would be enabled to concentrate the larger portion of the entire energy transmitted to the planet in his instrument, and the chances of effecting the latter are thereby increased many millionfold.

Besides machinery for producing vibrations of the required power, we must have delicate means capable of revealing the effects of feeble influences exerted upon the earth. For such purposes, too, I have perfected new methods. By their use we shall

rected new methods. By their use we shall likewise be able, among other things, to detect at considerable distance the presence of an iceberg or other object at sea. By their use, also, I have discovered some terrestrial phenomena still unexplained. That we can send a message to a planet is certain, that we can get an answer is probable; man is not the only being in the infinite gifted with a mind.

A MODERN WIZARD.

MR. TESLA'S MACHINE.

- Lord Lytton in "The Coming Race," and Mr. H. G. Wells in "The War of the Worlds" and "When the Sleeper Wakes," have both drawn pictures of what the world will be like when the scientific inventor really lets himself go. An article that Mr. Nikola Tesla has contributed to the "Century" shows that these forecasts—of which Lord Lytton's at least must have been a pure child of the imagination—were singularly accurate, and are now very likely to be realised. If Mr. Tesla succeeds in making half his discoveries available for daily use, we shall have everything at our command that the Vrilja had, and shall have gone a long way towards acquiring the amazing forces of the Martians. Some ten years ago, in a lecture to the Royal Institution, Mr. Tesla showed that if an electric current be reversed a great number of times a minute, it will develop powers immensely in advance of anything we can produce by other means. Acting on this principle, he has succeeded in

this principle, he has succeeded in producing what is really an induction coil with 150,000 alternations of current per second. With this huge "oscillator," as he calls it, the ordinary spark of a few inches becomes

**A Roaring Blaze 70 Feet
Across,**

while it produces such a disturbance of the electrical equilibrium in surrounding objects that, when at work, sparks an inch long can be drawn from a water main at a distance of 300ft. from the laboratory. Moreover, he has discovered a way of so "tuning" it that another coil similarly tuned will respond to its vibrations at a distance which he believes may be infinite, but which in practice does not seem to have been tested beyond 600 miles. He thus has at his disposal a means of conveying electric energy of millions of volts (2000 volts will kill a man) to a great distance in any direction he pleases, and, of course, without any connecting wires. No known substance or power can stop or insulate this current, which can travel indifferently through the earth or the air, nor can anyone tap or avail himself of it unless he possesses a

himself or it unless he possesses a coil exactly tuned to the vibrations of the oscillator. What this extraordinary machine can do outstrips all the stories of mediæval magic. By its use, Mr. Tesla claims that he can

Double the Food Supply

of the world. For he offers the best and most economical means of fixing the nitrogen which, as Sir William Crooks has told us, is the life of plants, and he can therefore make two ears of corn grow where one grew before. It can produce iron in vast quantities by a cheaper process than any hitherto attempted. It can also control at enormous distances an automatic machine, as, for instance, a crewless boat, which shall carry its own propelling and steering power, and yet be as entirely under the control of the operator seated in his study hundreds of miles off, as an organ is under the control of the player at the keyboard. Finally, though Mr. Tesla does not tell us so in this article, the battery can so "electrify"—to use the word in its popular sense—a room that an exhausted glass tube will glow with radiant light whenever it is brought within a certain distance of the floor or ceiling. If

distance of the roof or ceiling. If it does what its inventor expects of it, light and power should at no very distant date be within the reach of all, while the problem of feeding our increasing millions should be greatly simplified.

More Miracles Promised.

The facts so far have been proved by actual experiment, and may therefore be taken, to use the French phrase, as definitely acquired by science. But when Mr. Tesla goes on to tell us what he thinks the result of his discoveries will be, one does not wonder that an American biographer depicts him as much elated at his successes. He says that it will soon be possible to draw our supplies of electric force, not, as now, from magnets rotated by steam engines, or, still more expensively, by the decomposition of chemicals, but from the upper strata of the atmosphere. By these means we shall command a practically unlimited supply of power, and we can set about transforming the face of Nature in real earnest. War will, of course, be done away with, or rather it will be reduced to a contest of machines, at which the nations will be "simply interested, ambitious spectators." Then ma-

ambitious spectacles. Then machines which are now made of iron or copper will be made of aluminium—a theory, by the way, anticipated in “The War of the Worlds”—with the result that flying machines will be of daily use. These are, in fact, according to him, already on the way, and he prophesies that “the next year will see the establishment of an ‘air power,’ and its centre may not be far from New York. At a later date will arrive “a self-acting machine, deriving energy from the ambient medium,” which will really, but for the wear and tear of its parts, come as near perpetual motion as can be. Then will come a time when

**Earth Will be too Small to
Hold Us,**

and we shall get more anxious than most of us are at present to establish communications with the other planets. When this happens, we shall find Mr. Tesla ready and able

to oblige us. “My measurements and calculations have shown that it is perfectly practicable to produce on our globe, by the use of these

on our globe, by the use of these principles, an electrical movement of such magnitude that, without the slightest doubt, its effect will be perceptible on some of our nearest planets, such as Venus and Mars." What will happen if the Venusites and the Martians should turn out, when we do make their acquaintance, to be armed with powers as formidable as even Mr. Tesla's oscillator he does not stop to inquire. But it is to be hoped that all this will be carefully gone into before he is allowed to make his signal. How much of all this will stand further investigation remains to be seen. Although born in Hungary, Mr. Tesla has been domiciled for some time in America, where the desire for

"The Greatest Thing on Earth"

shows no signs of abatement. Hence we may consider that between some of Mr. Tesla's calculations and their fruition there is yet a step or two, and that these last may present difficulties as yet unthought of. Is it certain, for instance, that because the atmosphere of our globe offers no bar to the progress of Mr. Tesla's alternating current, the medium—if there is any—that occupies the interplanetary space will be equally

interplanetary space will be equally obliging? Or can he really prove that the sun, as he seems to assume, is the source of all the electrical energy of the earth? Some have thought that the electro-motive force of lightning, to take only one example, is developed by the friction of one cloud upon another when driven by strong winds; and the theory has much to recommend it. But when all this and some other wild theorising is disposed of, there seems little doubt that Mr. Tesla has discovered a means of transmitting energy to a distance, and also a new method of illumination, which probably surpasses anything we have yet dreamed of. If this be so, and if—which is a large supposition—his invention can be made commercially valuable, his oscillator may really work as great a change in the conditions of civilised life as did the steam engine.

Risk of Mr. Tesla's Experiments.

One word may be said as to the risk of handling the enormous forces now revealed to us. One of the very oddest things about the whole matter is that these alternating currents seem to be absolutely harmless to the living human organism.

less to the living human organism. Those of us who remember Mr. Tesla's visit to Britain early in his career may remember how he then horrified an assemblage of savants by transmitting through his own body a current a hundred times that which in other circumstances would have caused instant death. He assures us that the same immunity has attended his experiments throughout, and that neither he nor any of his assistants has ever suffered inconvenience so long as the vibrations were sufficiently rapid and the potential sufficiently high. He now offers to transmit through his own body the entire energy of the 40,000 horse-power dynamos now worked by Niagara, and the offer is, if rather foolhardy, an undeniable guarantee of good faith. He also tells us that he has transmitted through his own hands discharges which have caused thick metal wires to melt and drop like wax without feeling any particular sensation. As to the risk of fire, perhaps the less said about it the better. The fire insurance companies will certainly raise their rates of premium if there is any chance of one of Mr. Tesla's currents fetching loose.—*Pall Mall Gazette*.

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TESLA'S LATEST MARVEL.

TRANSMITTING ELECTRICITY WITHOUT LOSS.

(From the "Daily Mail.")

Niagara Falls to light the streets of London, to work the tramways of the metropolis, and to cook the dinners of its five million inhabitants!

Such is the prospect opened up by the discovery of a means of transmitting electricity over huge distances without loss, just made by Mr. Nikola Tesla, and flashed across the Atlantic.

In a recent lecture, Sir William Preece remarked, "The waterfalls of the Highlands may work the tramways of Glasgow, just as Niagara already works those of Baltimore." This prophecy may very likely come true, for now that Mr. Tesla has shown us how to transmit electricity economically, a revolution in many industries is foreshadowed.

WATER v. COAL.

"Where coal is scarce and dear and water abundant, as in Switzerland," says Sir William Preece, "water power is very much utilised. Where coal is abundant and cheap, as in England, it is uneconomical to adopt it."

The rise in the price of coal lends additional interest to Mr. Tesla's invention, and it is likely that our electrical engineers will set to work to devise schemes to generate electricity in the Highlands by water power, and on the coal-fields by steam power, and transmit cheap energy all over the United Kingdom.

United Kingdom.

Everyone knows that power may be transmitted to great distances electrically from a generator at one end of the circuit to a motor at the other. All over the world electrical energy, whether produced by steam engine, by waterfall, or other source, is being conveyed by means of wires to places often situated far away from the source of power.

In 1891 the electrical world was startled by the demonstration at Frankfort of the manner in which 140 horse power could be conveyed from the falls of the Nacker at Lauffen, 117 miles away, through three wires only four millimetres in diameter, with a net efficiency of 74 per cent., including all losses. The falls of Tivoli are now made to light the city of Rome, 16 miles away; the falls of Niagara supply energy to the city of Buffalo, 22 miles away, and many more similar instances might be cited.

The chief difficulty to be faced in the long-distance transmission of electricity is the power lost in the line by reason of its resistance, which fritters the current down to heat.

LIQUEFYING CASES.

For some years past Professor Dewar, F.R.S., and Professor Fleming, F.R.S., have been making a series of elaborate experiments on the behaviour of metals at very low temperatures. In his laboratory at the Royal Institution, Professor Dewar has gradually succeeded in liquefying all the known gases. First he liquefied oxygen, then air, and then finally hydrogen, which last gas becomes liquid at the marvel-

last gas becomes liquid at the marvel-
lously low temperature of minus
421deg. of the Fahrenheit scale.

Now Professors Dewar and Fleming
have discovered a most remarkable
fact, and that is, that all the pure
metals when cooled in liquid air under-
go a very great reduction in electrical
resistance and a very great increase in
conductivity. We know that the
passage of an electric current through
the best conductor known heats it.
But if we can cool this conductor down
to the temperature of liquid air or
liquid hydrogen its resistance to the
current will be enormously reduced.

When Mr. Nikola Tesla came over
to London in 1893 to deliver his fa-
mous lecture on high potential cur-
rents at the Royal Institution, he had
an interview with Professor Dewar,
and learnt of the latter's discoveries
as to the effect of low temperatures
on metals.

He has now apparently put these
discoveries to practical uses, and has
found a means of transmitting elec-
trical energy over long distances with-
out any loss. Further details of this
epoch-making invention will be eagerly
awaited. Mr. Tesla is reported to have
said that before his cold air insula-
tion can be used the wires will be
placed underground. In a trough, ex-
tending across the entire continent of
America, or across the Atlantic, would
be placed sawdust and water. A thin
metal tube capable of resisting a pres-
sure of 300lb. to the square inch will
be used for the purpose of transmit-
ting the current long distances. The
trough would be buried five or six feet
below the surface, and through a pipe
submerged in the substance intended

submerged in the substance intended to be frozen will then be forced a current of gas, probably hydrogen, reduced to a temperature of minus 200 degrees centigrade, which will suffice to freeze the material and neutralise the heat generated by the passage of the electricity.

NO LEAKAGE.

Mr. Tesla believes that no electricity will be wasted in transmission. The cost of the new insulation, he says, is less than that of the present method, hence the invention is indispensable to telephone and telegraph companies. Water power converted into electricity will be carried thousands of miles, and Mr. Tesla finds that Niagara's power can be brought to New York with a loss of not more than $\frac{1}{2}$ to 1 per cent.

It is interesting to compare this statement with the estimate made by Professor E. J. Houston and Mr. A. E. Kennelly as to the distance to which the energy of Niagara could be economically transmitted by electricity.

Taking established conditions and prices that are asked to-day for the apparatus, they have shown that in Albany, or anywhere else in the same radius 330 miles from the Falls, the converted energy of the great cataract could be delivered cheaper than good steam engines on the spot could make steam power with coal at the normal price there of 12s per ton. By Mr. Tesla's invention this radius of 330 miles has been immeasurably enlarged, and there is now practically no limit to the distance to which electricity may be conveyed. The cost of the insulation is the only factor to be considered.

considered.

UNLIMITED POWER

Great Scientific Discovery

ENTIRELY NEW THEORY

Nikola Tesla, the noted inventor, is preparing to make public within the near future the announcement of a discovery which will make available to the world new sources of energy.

As this discovery will make it possible to tap inexhaustible streams of power at any point on the globe, great exchanges will follow in social life. Government will become a sort of officious policeman, busybody, and benevolent tyrant, which will convert the human race into a society like the bees.

What this noted scientist has found is not a form of atomic energy, which he declares to be a fantastic hope, but it is a "universal truth," of such a nature that probably it cannot even be patented. To quote his exact words:—

"I positively expect that within the next decade new sources of energy will be opened up which will put at the disposal of mankind everywhere power in unlimited amounts.

"In this connection I have made a discovery which I expect to announce as soon as I have worked out the theory and design of apparatus for practical purposes.

"I want to be emphatic in my condemnation of the idea that atomic energy will ever be our source of power. This is an illusory idea against which I have preached for years. In my experiments with peculiar vacuum tubes operated under tensions of 12,000,000 volts, atoms are shattered, but there is no liberation of energy observable such as would be expected according to modern theory. But even if the latter were true, it still would take much more energy to disintegrate the atoms than

energy to disintegrate the atoms than can be recovered by harnessing the liberated energy, however great it might be.

ENTIRELY NEW PRINCIPLE.

"What I am referring to is an entirely new principle which I have already experimentally demonstrated."

Asked if his source of energy was electricity, sun power, or some other force already known, Dr. Tesla shook his head negatively, and refused to affirm any guess, indicating that he would choose a scientific forum from which to make the definite announcement when he was ready.

"Will revolutionary changes follow?"

"I don't believe they will. New ideas are adopted gradually. It is inevitable that those who are in the forefront of the advance will keep their places. Our life is now so regulated that no advance whatever could completely upset the existing order.

"But if you are referring to sweeping changes in the social system, I believe they will take place in very rapid succession, and will be great in so far as the limits of accomplishments of an individual are concerned.

"The technical advances are inevitably driving us toward the grossest kind of materialism. And it will not be very long before the social system of bee life will become universal," is Dr. Tesla's view of the possible result of his discovery.

LEISURE IS FATAL

"Is it not possible," he was asked, "that human wants and needs will be so easily satisfied through cheap power and increased production that we will turn increased leisure to the development of arts and of the soul?"

Dr. Tesla was pessimistic. "Is the human race any less materialistic than it was 2000 years ago?" was his counter-question.

"What should be done with the increased leisure which will be available?"

"Too much leisure, and civilisation will go to naught," the doctor answered.

too much leisure, and civilisation will go to pot," the doctor answered emphatically. "Man was born to work, suffer and struggle. If he does not, he'll go under."

TESLA'S THEORY.

Where the average mind gapes and and stares at the marvels of science, Dr. Tesla sees no cause for wonder. Radio, television, wireless telephone—these are merely the application of cause and effect as simple as one step after another. He points out that a skyscraper would be a wonder to a savage dwelling in the desert, while it is a commonplace to every one in a modern city.

Thousands of men and women will greet the announcement of Tesla's cosmos-shaking discovery incredulously; but that is because they do not know enough of science to understand the vast possibilities in this direction, according to the famous scientist. There is nothing impossible—or even improbable—in the discovery of a great new source of energy. Dr. Tesla says he has the secret, and as soon as he has designed the mechanism by which to generate this new energy, he will tell the world of his invention, which will probably be of so general a nature to render any patent or similar protection impossible. It will not be the first revolutionary discovery to Dr. Tesla's credit. His past work is now common property.

Dr. Tesla was the first to conceive an effective method of utilising alternating current. He discovered the principle of the rotary magnetic field embodied in the apparatus used in the transmission of power from Niagara Falls, as well as many new forms of electrical apparatus.

He has devoted a great deal of thought and study to the development of the aeroplane, especially to a heavier than air machine, that would ascend vertically.

TESLA'S GREAT WORK.

Many give to this versatile scientist the title of "father of radio." As far back as 1890 he delivered a series of

back as 1890 he delivered a series of lectures in which he submitted drawings and plans that later gave ideas to men who thought into being the wireless sets that were used for telegraphic communications.

In later years Dr. Tesla startled the scientific world when, while giving a lecture before the Institute of Electrical Engineers, he thrilled the audience by allowing 2,500,000 volts of electricity to pass into his body.

Dr. Tesla in recent years renounced all showmanship. He works quietly and in seclusion, avoiding empty publicity which, to a man of his intellect and calibre, is distasteful in the extreme. And his work, which to now has been almost unnoticed, will probably be published soon, and when it is—scientific and social revolution!

NIKOLA TESLA.

(By Frank G. Carpenter in the Los Angeles "Illustrated Weekly Magazine.")

II.

TESLA'S NEW INVENTIONS.

And now to Mr. Tesla's latest discoveries. If he has what he thinks he has he will revolutionise labor and give man greater benefits than have come from any inventor since the world began. Indeed, the statements made me to-night in the mouth of any other man would be a fair test of insanity. But many of Tesla's wild statements of the past have been verified by great working inventions. He said he could harness Niagara, and through his experiments in the rotary magnetic fields Niagara is now furnishing a power equal to that of tens of thousands of horses, and electrical works are being run by the same principle all over the globe. The New York subway, for instance, is founded upon it; Tesla demonstrated that wireless telegraphy could be done in 1893, and it is a question whether his inventions in that field are not prior to those of Marconi or De Forrest.

To-night he told me that he had almost completed inventions by which he could send electrical energy to any dis-

most complete inventions by which he could send electrical power to any distance without wires, and that in any quantity, small or great. Said he:—

"I have proved that power can be thus transmitted. Let us suppose I have my plant at Niagara and you are running a sugar factory in Australia; by my discoveries it will be possible to send you 100, 500, or 1,000 horsepower for your factory, and to supply the same regularly, by the force furnished from Niagara Falls. Suppose you are travelling in the wilds of the Andes and make your camp on the shores of Lake Titicaca. By the outcome of this principle you may have telegraphed to you the instantaneous reports of the news of the world as it happens from time to time. You may cook your dinner over an electric fire thus transmitted, and you may have the same at will on any part of the globe. We shall be able to send power from place to place at will, and that at such a small cost that it will be industrially profitable."

THE TRANSMISSION OF ENERGY WITHOUT WIRES.

"How did you discover that this might be done, Mr. Tesla?" I asked.

"I have been for years working on the transmission of electrical energy, and in 1898 established a laboratory on the edge of the Rocky Mountains, near Colorado Springs. My laboratory there was over 6,000ft. high, higher than the top of Mount Washington, and I had extraordinary condi-

tion, and I had extraordinary conditions for my experiments. Colorado is famous for its natural displays of electrical force. The earth at times is alive with electrical vibrations, and the air is full of electricity. I have seen 12,000 lightning discharges within two hours, and all within a radius of 30 miles of my laboratory. These discharges were of great violence, some of them looking like trees of fire on the heavens. It was among such discharges that I had my electrical instruments, and studied the principles of electricity transmission through the earth and air. One day while watching the lightning I noticed that the discharges afar off often affected the instruments in my laboratory more than those near by. Upon examination I found that this could not be caused by the difference of intensity in the individual charges."

"What could it be?"

"Through instruments made for the purpose I tested the matter from time to time and finally came to the conclusion that the vibrations caused by the lightning moved around the world, and that there were stationary waves. I could gauge the discharges near the laboratory and see them fade away, and, after a certain fixed period, find them returning almost with no loss of power. In short, this planet, big as it is, was acting as a conductor, and I became convinced that upon it not only telegraphic messages, but also the modulations of the human voice and electrical power in unlimited amounts.

electrical power in unlimited amounts, could be carried around the entire globe, and sent to any part of it with hardly any perceptible loss. With my transmitter I actually sent electrical vibrations around the world and received them again, and I then went on to develop my machinery. I had, as I have told you, been studying and inventing along the lines of electrical transmission, and was ready to take advantage of my discovery. I have since so improved the means of individualisation and isolation that such energy may be sent in any amount to any fixed place without danger of its going elsewhere or affecting others, and I believe the individualisation can be carried out to almost any degree."

NIAGARA FOR THE WORLD.

"Will this enable the power of Niagara to be sent anywhere over the world?"

"Yes. I have been experimenting at my laboratory on Long Island. I have machinery and buildings there which have cost in the neighborhood of £70,000, and the results show me that a plant could be erected at Niagara which can transmit its force to any place desired. I am designing such a plant now at my laboratory, and would have had it completed had it not been for unforeseen delays, which have nothing to do with its technical features. The design which I have adopted will have a transmitter which will emit a wave complex of a total

will emit a wave complex of a total maximum activity of 10,000,000 horse-power, one per cent. of which is enough to girdle the globe. This enormous rate of energy delivery—it is twice as much as the force of Niagara Falls—is obtainable only by the use of certain artifices which I shall make known some time in the future.

"We have been offered 10,000 horse-power from the Canadian Power Company. What I want to do is to build machinery there and transmit this power to various parts of the globe. The value of that amount of horse-power would be about £40,000 per year, and a plant erected to take ad-

vantage of it will pay large dividends."

"How much would the plant cost?"

"It might cost in the neighborhood of £400,000, but its value would be enormous, and its success would revolutionise the working forces of the globe. It would result in other plants being erected at other places, and in the utilisation of all the great waterfalls for the work of man."

MOTHER EARTH PUT TO WORK.

"By this invention every live part of mother earth's body would be brought into action. Energy will be collected all over the globe in amounts small or large, as it may exist, ranging from a fraction of one to a few horse-power or more. Every waterfall can be utilised, every coalfield made to produce energy to be transmitted to great

produce energy to be transmitted to vast distances, and every place on earth can have power at small cost. One of the minor uses might be the illumination of isolated homes. We could light houses all over the country, by means of vacuum tubes operated by high frequency currents. We could keep the clocks of the United States going and give every one exact time; we could turn factories, machine shops and mills, small or large, anywhere, and I believe could also navigate the air.

THE TRANSMISSION OF INTELLIGENCE.

"One of the most important features of this invention," said Mr. Tesla, "will be the transmission of intelligence. It will convert the entire earth into a huge brain, capable of responding in every one of its parts. By the employment of a number of plants, each of which can transmit signals to all parts of the world, the news of the globe will be flashed to all points. A cheap and simple receiving device, which might be carried in one's pocket, can be set up anywhere on sea or land, and it will record the world's news as it occurs, or take such special messages as are intended for it. If you are in the heart of the Sahara, your wife can telegraph to you from Washington, and if the instrument is properly made you alone will get the message. A single plant of a few horsepower could operate hundreds of such

power could operate hundreds of such instruments, so that the invention has an infinite working capacity, and will cheapen the transmission of all kinds of intelligence."

U.S. Inventor Claims He Can Send Power By Wireless

NEW YORK, Friday.

The famous electrician Nikola Tesla, celebrated his 80th birthday by announcing an invention for transmitting power without wires.

Tesla predicted that this development of wireless power will overshadow his other accomplishments, and usher in a new civilisation.

"Thus, power developed at Muscle Shoals, may be transmitted to England, China or Little America in the Antarctic, with equal ease at comparatively little cost," he said.

"Several European governments have promised their co-operation," he added.

The plant utilising his invention will

be installed in some place in Europe within a year.

The scheme will utilise 100,000,000 volts compared with 18,000,000 volts which is the maximum so far attained in any laboratory.

[Nikola Tesla comes from the border country of Austria and Hungary. His father and mother were both inventors. He began his practical career at Budapest in 1881, where he made

at Budapest in 1881, where he made his first electrical invention, a telephone repeater. Since 1884 he has been a resident of America, becoming a naturalised citizen. He first invented a system for transmitting power without wires in 1897. He has been of a plant for transmission of power by a plant for transmission of power by wireless.]

WAR BY AUTOMATA.

When Nikola Tesla writes of the possibilities of the future we listen because we remember that this still young man has, as an electrician, already accomplished the apparently impossible. In the June "Century" he says many things that seem uncanny, but says them in the language of a scientist. He believes war and the spirit of war, which now sap the energy of the human race, can be driven from the world. "An entirely new principle must be introduced, something that never existed before in warfare—a principle which will forcibly, unavoidably, turn the battle into a mere spectacle, a play, a contest without loss of blood. To bring on this result men must be dispensed with; machine must fight machine." Moreover, he claims to have invented an automaton which can be controlled at any distance by a new art, for which the name "telautomatics" has been suggested. It is the use of "electrical vibrations," the harnessing of the atmosphere to convey reason, intelligence, brain power. The advent of this amazing invention and continuous development in this direction must ultimately make war a mere contest of machines with-

out men and without loss of life. M. Tesla assures us that it is practicable to transmit natural energy, power, from a part of the world where it may be running waste—say, Niagara—to another part where it would be priceless. Export of power would then become the chief source of income for many happily-situated countries, as the United States, Canada, Central and South America, Switzerland, and Sweden. Men could settle down everywhere, fertilise and irrigate the soil with little effort, and convert barren deserts into gardens, and thus the entire globe would be transformed and made a fitter abode for mankind. It is highly probable that if there are intelli-

made a letter about for mankind. It is highly probable that if there are intelligent beings on Mars they have long ago realised this very idea, which would explain the changes on its surface noted by astronomers.